REMARKS

Claims 1-24, 26-31, and 39-67 are pending in this application. Reconsideration of the application in view of the Amendment filed June 19, 2003, as supplemented herein, is respectfully requested.

Applicants appreciate the courtesies extended to their representatives, Mr. Roe and Mr. Hadidi, by Examiner Wu during the July 10 personal interview. The reasons presented at the interview as warranting favorable action are incorporated into the remarks below and constitute Applicants' record of the personal interview.

I. The Claims Define Patentable Subject Matter

During the July 10 personal interview, Applicants' representatives asserted that Jozefowski does not teach separating exterior or interior boundary pixels and that Jozefowski does not teach separating boundary and non-boundary pixels because Jozefowski views pixels as a one-dimensional array, draws images using the one-dimensional array in scan line order, and hence has no need to determine, distinguish between, nor separate pixels of any type. The Examiner asserted during the July 10 personal interview that Figure 2C of Jozefowski shows two boundary regions, an interior boundary region and an exterior boundary region, and pixels labeled 1-4 which lie on the boundary. From Figure 2C alone without any textual support, the Examiner asserted that Jozefowski teaches an encoder that separates the binary pixels into interior boundary pixels and exterior boundary pixels, as recited in claims 1-24 and 26-29, and as teaching separating the pixels into boundary pixels and non-boundary pixels, as recited in claims 30, 31 and 39-59.

Applicants respectfully disagree. Jozefowski teaches a frame store for holding image data (sub-pixel data) at a resolution higher (Figure 2A) than that required for a display system (Figure 2B). The system of Jozefowski takes data from a frame store, converts it into a form having the lower resolution required by the display system, and in so doing uses the stored

sub-pixel data to determine the image data for the relevant display pixels, and outputs this lower resolution data to the display system (see Abstract).

Figure 2A shows a line 11 stored at twice it's normal display resolution both horizontally and vertically. Figure 2B shows line 11 at a lower resolution as displayed using simple filtering techniques. The Figure 2A line 11 "lights" the sub-pixels 23 it actually passes through, and even at a resolution twice that of Figure 2A (two blocks per centimeter instead of one) the Figure 2A line is still stepped and jagged. Figure 2B shows the same line as actually seen on a one block per centimeter display, with anti-aliasing. Here, the sub-pixel data in the frame store has been used to calculate the "transparency", i.e., image intensity value, of each display pixel, so that where a pixel contains four lit sub-pixels it is filled in black (23), where it contains three it is filled in dark gray (24), and where it contains two or one it is filled in light gray (25 and 26). See Jozefowski, page 20, lines 6-25. Figure 2C shows an edge (rather than a line) stored, generated, and displayed in the same way as the line of Figure 2B. See Jozefowski page 20, lines 26-27.

The use of sub-pixel data in the frame store to generate the "transparency", i.e., the image intensity value, of each display pixel will now be discussed in more detail. Figure 5A shows the stored numeric values representing part of a thick straight line, super-sampled at twice the horizontal and vertical display resolutions, and Figure 5B shows the same numeric representation after weighted "filtering" to invert the stored values to the lower resolution display values. Each display pixel comprises a number of sub-pixel elements. These are combined in a suitable manner to obtain an acceptable lower resolution image. A simple system which maintains the frame store at twice the horizontal and vertical display resolution would therefore have four sub-pixels for every display pixel. In Figure 5A, each store (sub-pixel) location stores a binary value, i.e., a zero or one, as the image intensity value. These image intensity values are fed through a simple filter, whereby the sub-pixel location values

are each multiplied by 4, the four results are added together, and the resultant sum is used to define the display pixel value. In this way, the four sub-pixels (only one of which is of value 1 in the bottom left-hand corner coordinates (1, 1)) of Figure 5A are converted to

$1 \times 4 + 0 \times 4 + 0 \times 4 + 0 \times 4 + 0 \times 4 = 4$

which is a value for the corresponding pixel at coordinate (1, 1) in Figure 5B, while the four sub-pixels each of value 1 immediately above the pervious one (at coordinate (1, 2) in Figure 5A) are converted to

$1 \times 4 + 1 \times 4 + 1 \times 4 + 1 \times 4 = 16$

for the pixel at coordinate (1,2) in Figure 5B. Similarly, the four sub-pixels, three of which are of value 1 to the right of the later at coordinate 2,2 are converted to

$1 \times 4 + 1 \times 4 + 1 \times 4 + 0 \times 4 = 12$

(see Jozefowski page 24, line 13 through page 25, line 12).

In essence, Jozefowski's method for converting high resolution frames into anti-aliased low resolution frames consists of taking a predetermined number of consecutive pixels in the frame buffer (in the above example, 4), determining a transparency value, i.e., image intensity value, of a single pixel to be displayed on the lower-resolution display device based on a formula taking into account the intensity values of the predetermined number of consecutive pixels, as discussed above, displaying the single pixel value on the low resolution display device, retrieving the next predetermined number of consecutive values in the frame buffer, and repeating this process until all of the pixels in the high resolution frame buffer have been processed to create a low resolution image on the display device.

Thus, the system of Jozefowski views pixels as a one-dimensional array, draws images using the one dimensional array in scanline order (see page 21, lines 29-31), and hence has no need to separate, calculate, or determine if pixels are boundary pixels, or if pixels are interior/exterior boundary pixels, because of the sequential many-to-one (in the

example above, 4:1) manner in which Jozefowski translates high resolution frames into low resolution frames.

In fact, Jozefowski even fails to separate boundary pixels from non-boundary pixels, because Jozefowski takes a predetermined number of sequential pixel values in the frame buffer (in the above example, 4), uses the individual intensity values of the predetermined number of consecutive pixels to create a single low resolution pixel value, and then moves on to the next predetermined number of sequential pixel values in the frame buffer to generate the next low resolution pixel, not taking into account, i.e., completely ignoring, whether or not the pixels retrieved from the frame buffer are boundary pixels or non-boundary pixels.

Therefore, Jozefowski has no need to separate the pixels into boundary pixels and non-boundary pixels, as recited in claims 30, 31 and 39-59, let alone to separate boundary pixels into interior boundary pixels and exterior boundary pixels, as recited in claims 1-24 and 26-29. Therefore, it is respectfully submitted that Jozefowski fails to teach or suggest all of the recited features of claims 1-24, 26-31, and 39-59.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-24, 26-31, and 39-67 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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